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WATER MANAGEMENT PLAN

Shaft-Sinking Phase

C-b Tract

Submitted to:

Area Oil Shale Supervisor

March 2, 1979

By

Occidental Oil Shale, Inc.

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PLANNED OBJECTIVES

Dewatering operations associated with the shaft-sinking phase of in-situ development of oil shale at C-b Tract will be maintained in accordance with a water management plan guided by the following objectives:

- Dewater the mine.
- Conserve and develop water resources in such a manner as to allow maximum beneficial use for industry and agriculture.
- Protect surface and groundwater resources from significant reduction in quality according to historic and practical use criteria.
- Provide water supply for tract development and operation.
- Provide water supply required to augment depletions of flow to senior water rights holders which would have otherwise been available.
- Monitor surface and groundwater resources to detect and predict changes attributable to operations on the Tract.
- Establish cost effective and environmentally sensitive water-handling practices in view of stated objectives.

WATER INFLOW ESTIMATES

Mine water collection and distribution facilities associated with shaft-sinking operations were designed according to the following estimates of mine water inflow:

	Normal Maximum Flow (GPM)
PRODUCTION SHAFT	1000
SERVICE SHAFT	600
VENTILATION-ESCAPE SHAFT	800

Flows from the Production and Service Shafts will be combined at a station connecting the two shafts and pumped to the surface. A 1500 gpm contingency for inflows exceeding the estimates for either the Production or Service Shafts was applied in the design of water handling facilities in the shafts. Specifications thus allow for a maximum flow condition of 3100 gpm. Application of a 1500 gpm contingency to the inflow estimate for the Ventilation-Escape Shaft yeilds a design criteria of 2300 gpm.

WATER MANAGEMENT CONTINGENCY PLAN

Mine water inflows encountered during shaft sinking will be pumped to the surface and temporarily stored in impoundments to allow for settlement of suspended solids. Following storage in the impoundments, the mine water would be available for consumptive use, discharge into streams, land application, reinjection, or a combination of these handling methods.

Among the first considerations of water management is on-site comsumptive use. An estimated 1250 gpm would be necessary to meet consumptive needs. Anticipated on-site uses of mine water produced during shaft sinking are given below:

Water Use	GPM
Ventilation Exhaust (Net loss)	130
Mine Muck	50
Construction Use, Dust Control, etc.	300
Shale Disposal and Revegetation	750
Potable Water (less return)	20
	1250

If mine water inflows are insufficient to meet consumptive needs, importation of water would be necessary.

Quantities of water in excess of that required for consumptive use will be discharged into natural watercourses. Discharge limits for mine water are specified in the National Pollutant Discharge Elimination System (NPDES) draft permit recently issued to the C-b Shale Oil Project. Any changes in flows or water quality beyond that allowed by the permit will be assessed and remedial action taken.

Water stored in impoundments will also be available for use in a land treatment

program involving sprinkler irrigation. The water will be applied at rates commeasurate with soil and vegetation capacity. Native vegetation and wildlife will be monitored to determine the impact of mine water application.

A test reinjection system is planned to assess the feasibility of constructing a network of injection wells. Reinjection of mine water has the advantage of conserving water for future use and minimizing discharge into surface streams. Existing monitoring wells in the vicinity of the test injection field will be recompleted to restrict injected water to prescribed intervals of the bedrock formation.

WATER MANAGEMENT FACILITIES

Subsurface Facilities

Progressive grouting of the Ventilation-Escape Shaft, the Production Shaft, and the Service Shaft during shaft-sinking will be employed to diminish mine water inflows. As depicted in Figure 1, pilot holes will be drilled in advance of each shaft to better gage mine water inflow rates. The presence of a significant quantity of water in the pilot holes would serve to indicate the need for stage grouting in the interval of concern. Stage grouting is anticipated to significantly reduce the combined mine water inflows of the Production and Service Shafts and the Ventilation-Escape Shaft and will be employed as deemed necessary on a cost-effective basis. Water-handling facilities are designed to accommodate inflows of 2300 gpm in the Ventilation-Escape Shaft and 3100 gpm in the Production and Service Shafts. The locations of the three shafts are given in Figure 2.

Mine water inflows of sufficient quantity to penetrate the protective cover of grout will be collected in water rings, transferred to subsurface sumps, and pumped to the ground surface for distribution. As shown in Figure 1, the water rings are collection galleries incorporated within the concrete shaft linings.

Water collected within water rings during sinking of the Ventilation-Escape Shaft will initially be lifted directly to the ground surface by 125 HP submersible pumps. The pumps will be installed within water rings located at depths of 285 feet, 650 feet, and 1000 feet below the ground surface. A length of pipe extending to the bottom of the shaft will serve to connect the pumping systems. Water accumulated in the bottom of the shaft at any given stage will be handled by submersible pumps and lifted to the surface by the succession of pumps within the water rings.

A mid-shaft pumping station will be constructed at a depth of 1100 feet as shown in the cross-section of the Ventilation-Escape Shaft given in Figure 3. Two banks of pumps will be installed at the station, each consisting of three 200 HP pumps and one 100 HP pump. After installation of the mid-shaft system, the pumps in the water rings will be removed. Water collected in the rings will be drained through lines terminating at the mid-shaft station and temporarily stored in a sump (Figure 6). The mine water collected in the sump would then be pumped directly to the ground surface.

As shaft-sinking progresses below a depth of 1100 feet, three 125 HP "sinking" pumps (Figures 4, 5) will be mounted on the shaft walls to pump water to the mid-shaft station. Additional pumping stations, described in Figure 3, will be constructed at depths of 1460 feet and 1667 feet. The station 1460 feet below the surface is shown in more detail in Figure 7. The pumping system designed for 1667-foot level is similar to that of the mid-shaft station except that only two 200 HP pumps will be connected in each bank. The "sinking" pumps will be used between stations throughout shaft-sinking.

The water control system devised for the Production and Service Shafts is similar to that of the Ventilation-Escape Shaft except that pumps will be sized for differing water requirements. As shown in Figure 8, the Production and Service Shafts will share a common mid-shaft station. Lines will be installed to pump water to the surface through either shaft, although it is expected that only one shaft would be used for this purpose at any given time.

Surface Facilities

Storage Ponds and Pipelines

Mine water pumped to the ground surface from the three shafts will be transported through pipelines and discharged into two 5-acre-foot storage reservoirs or ponds located between the Ancillary and Mine Support areas (Figure 2). The

ponds as sketched in Figure 9, have a storage capacity of 3.26 million gallons. Temporary storage of the mine water in the ponds allows for partial settlement of suspended solids to the levels required for discharge by the NPDES draft permit. Water stored in the ponds is then available for consumptive use (primarily for construction purposes), discharge, or transfer to another storage facility to allow for further settlement of suspended solids.

Discharge of water from the ponds will be in accordance with NPDES specifications. Flow will be monitored continuously at the discharge point and water quality samples will be obtained at the required frequencies. A rock drainage blanket, an erosion control basin, and an erosion control drainage area will be constructed below the discharge point. A well has been constructed to detect seepage, if any, from the ponds through use of a neutron probe. Water quality samples will also be obtained from the well.

Water in the ponds which is not consumptively used or discharged will be pumped upslope through a 14-inch pipeline to another set of ponds southwest of the process area (Figure 2). The "upper ponds", as depicted in Figure 10, will allow for further settlement of suspended solids. Water from the ponds will be of sufficient quality for use as service water, fire-fighting water, and in various programs including land application and reinjection. Pipelines will connect the ponds to each plant location to provide water in the event of a fire.

Land-Treatment/Sprinkler-Irrigation System

Land application of mine water obtained from the upper ponds will be accomplished through development of the sprinkler-irrigation system shown in Figure 11. The system will be constructed in two phases and will have an ultimate distribution capacity of approximately 2500 gpm. As shown in Figure 11, four irrigation

lines (A.B.C and D) are planned. During Phase I, the entire B-line will be installed to yield a distribution capacity of 650 gpm.

The second phase of development will proceed as necessary with the completion of the A-line and installation of the C and D lines. Phase II will thus provide an additional 1850 gpm capacity to the system.

Reinjection System

Mine water stored in the upper ponds will be used in a test reinjection system to be constructed in the south-central portion of C-b Tract. The test injection wells are designed to accommodate a total of 500 gpm. Water from the ponds will be treated with a biocide, an oxygen scavenger, and a scale inhibitor prior to reinjection in the test system. The test wells will provide design criteria for the primary plant system. Alternative locations are being studied to maximize cost effectiveness of the primary system. The primary system will be equipped to deaerate and chemically treat up to 2500 gpm as dictated by test plan results. Chemical treatment in the primary system will also involve a biocide and a scale inhibitor. Oxygen removal, however, will be accomplished by stripping.

how much & to where
how monitored & protected

1000 Acre-foot Reservoir

If mine inflows are significantly greater than anticipated, the sprinkler irrigation system and the reinjection system will be expanded. In addition, a 1000 acre-foot dam has been designed for construction in East No-Name Gulch (Figure 2). The dam may be built to provide flexibility to water management contingency plans.

FUTURE WATER MANAGEMENT PLANS

Water management plans for subsequent mining and retorting phases are currently being developed. Upon completion of shaft-sinking, a permanent mine dewatering system will be installed which will replace the existing system. Specifications of the system will be available as they are devised.

The objectives maintained during the shaft-sinking phase will be furthered during tract development in conjunction with related water management constraints, including the NPDES permit as well as a water augmentation plan and consent decree, a reinjection permit, a development monitoring plan, and a mined land reclamation plan. Flexibility will necessarily be maintained in the evolution of the water management plan in order to best meet its stated objectives.

APPENDIX

(Figures)

Figure 1 - Typical Vertical Cross Section of Shaft Water Control System

Figure 2 - General Arrangement of Surface 5 A.F. Settling Pond Locations

Figure 3 - Ventilation-Escape Shaft, General Arrangement Pump Stations

Figure 4 - Typical Pump Niche Arrangement

Figure 5 - Mounting Arrangement, Sinking Pumps

Figure 6 - Mid-Shaft Station - General Arrangement

Figure 7 - Lower Shaft Station - General Arrangement

Figure 8 - Production Shaft, General Arrangement Pump Stations

Figure 9 - Lower Ponds - Grading & Drainage Arrangement

Figure 10- Upper Ponds - Grading & Drainage Arrangement

Figure 11- Sprinkler Irrigation System General Arrangement

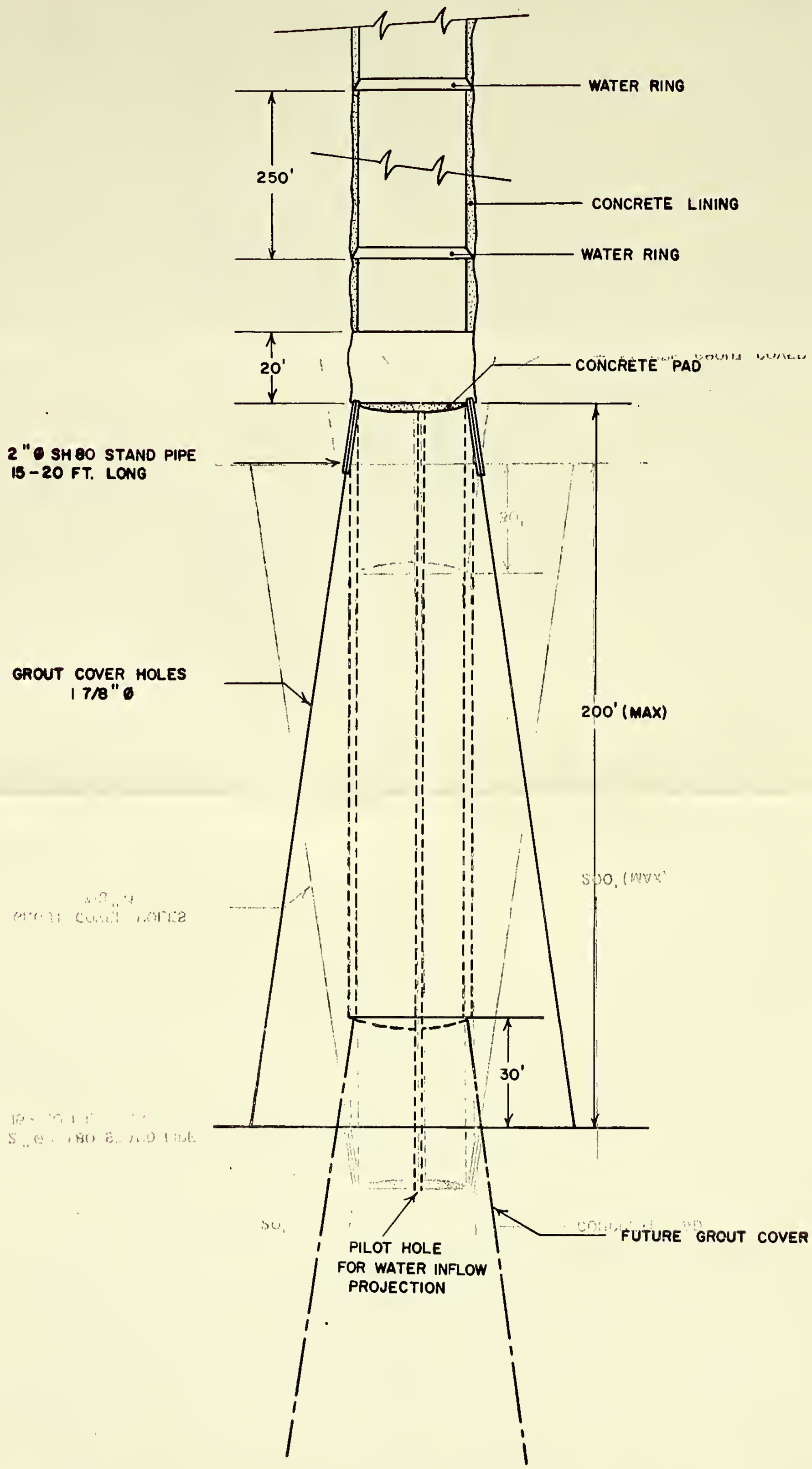


FIG. - 1
VERTICAL SECTION
Typical C-b Shaft Water Control System

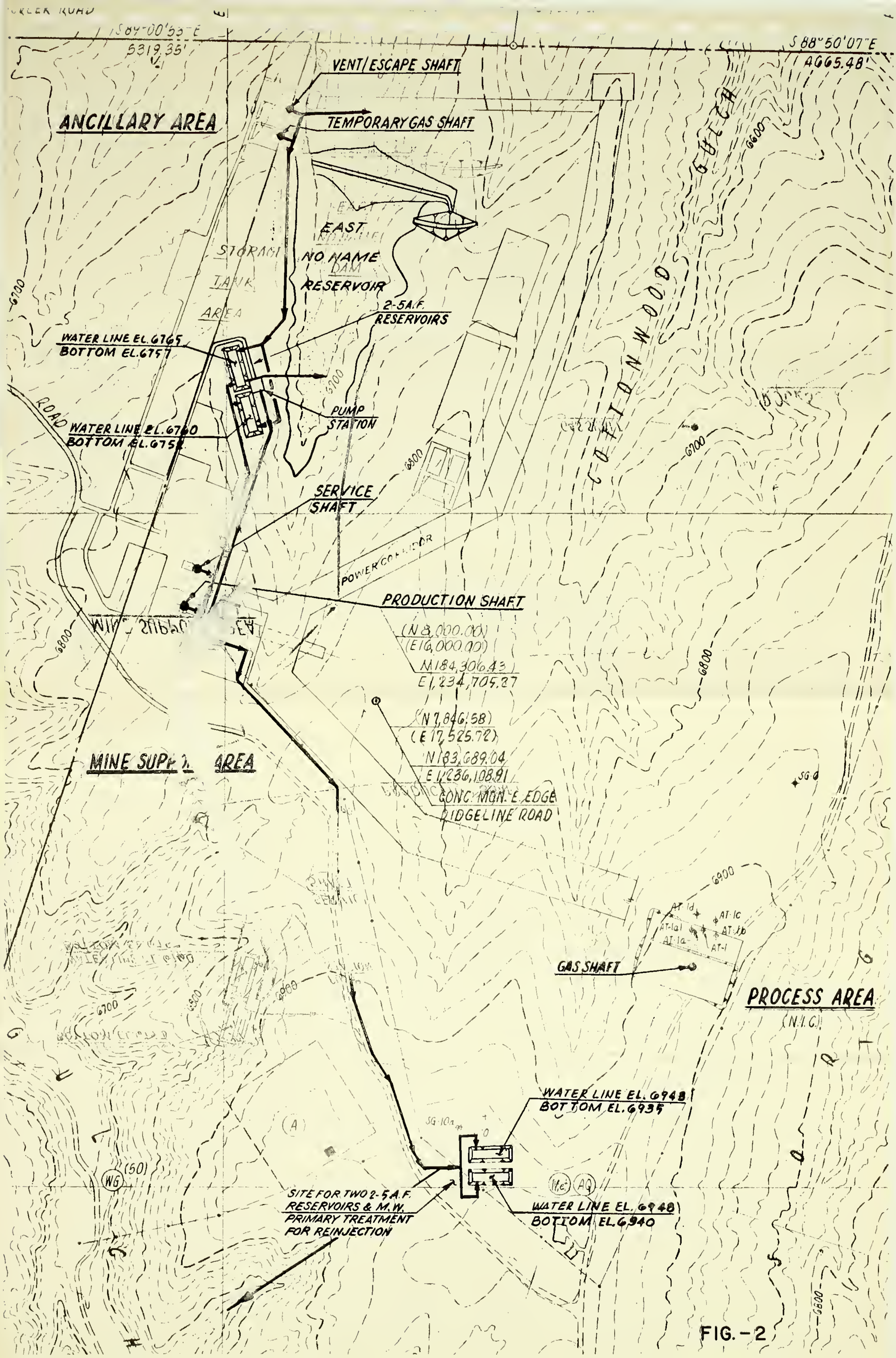
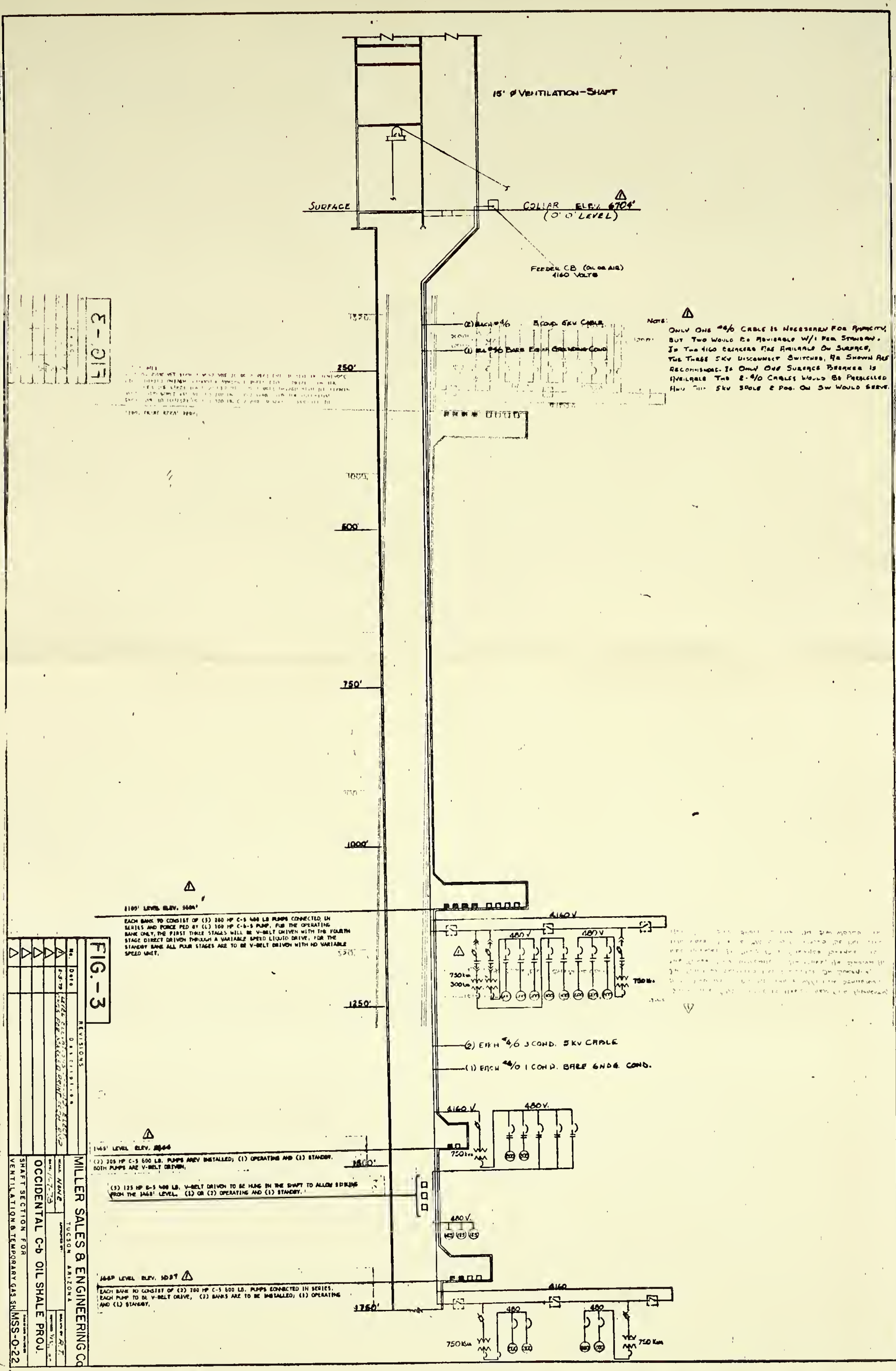
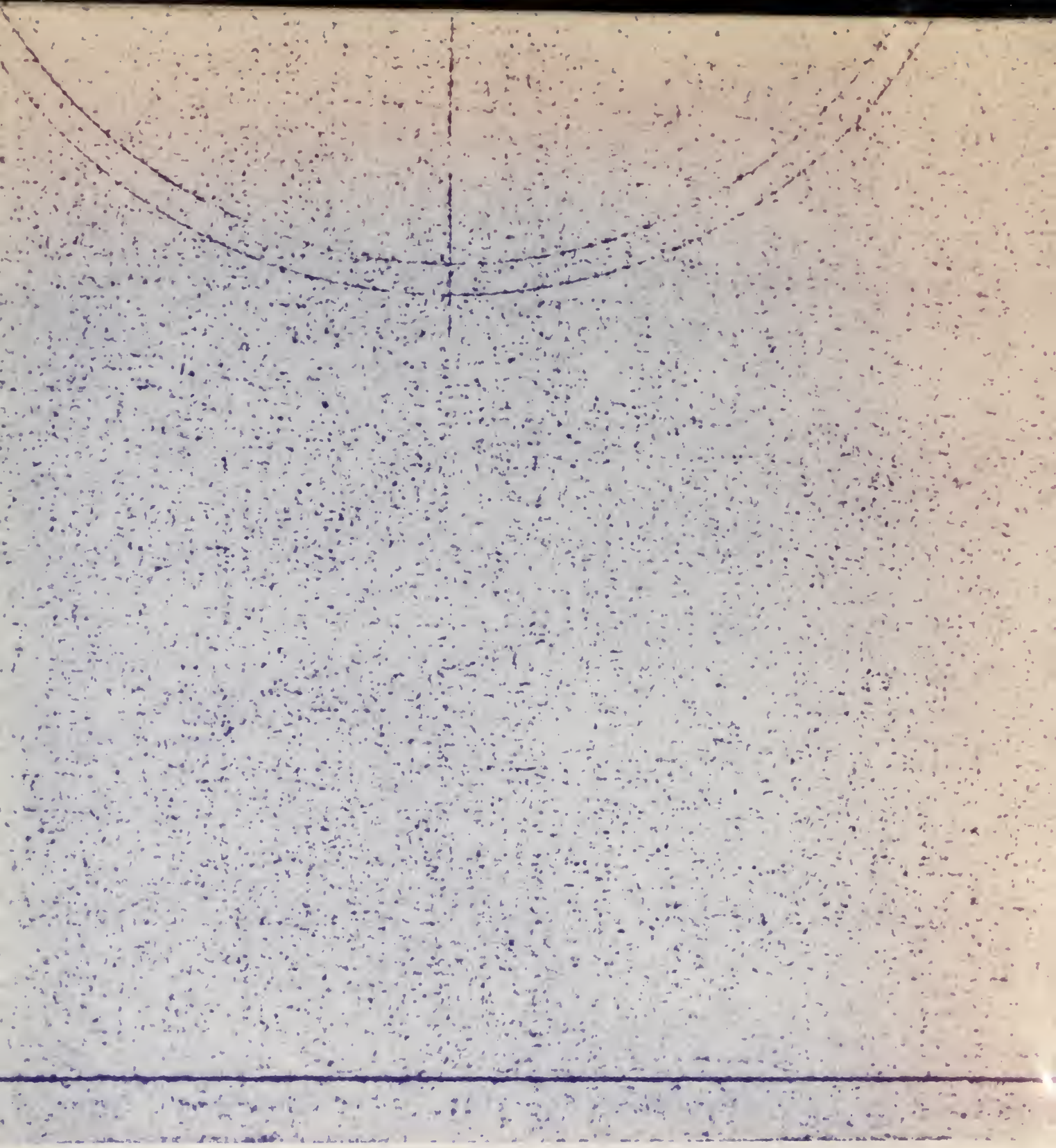
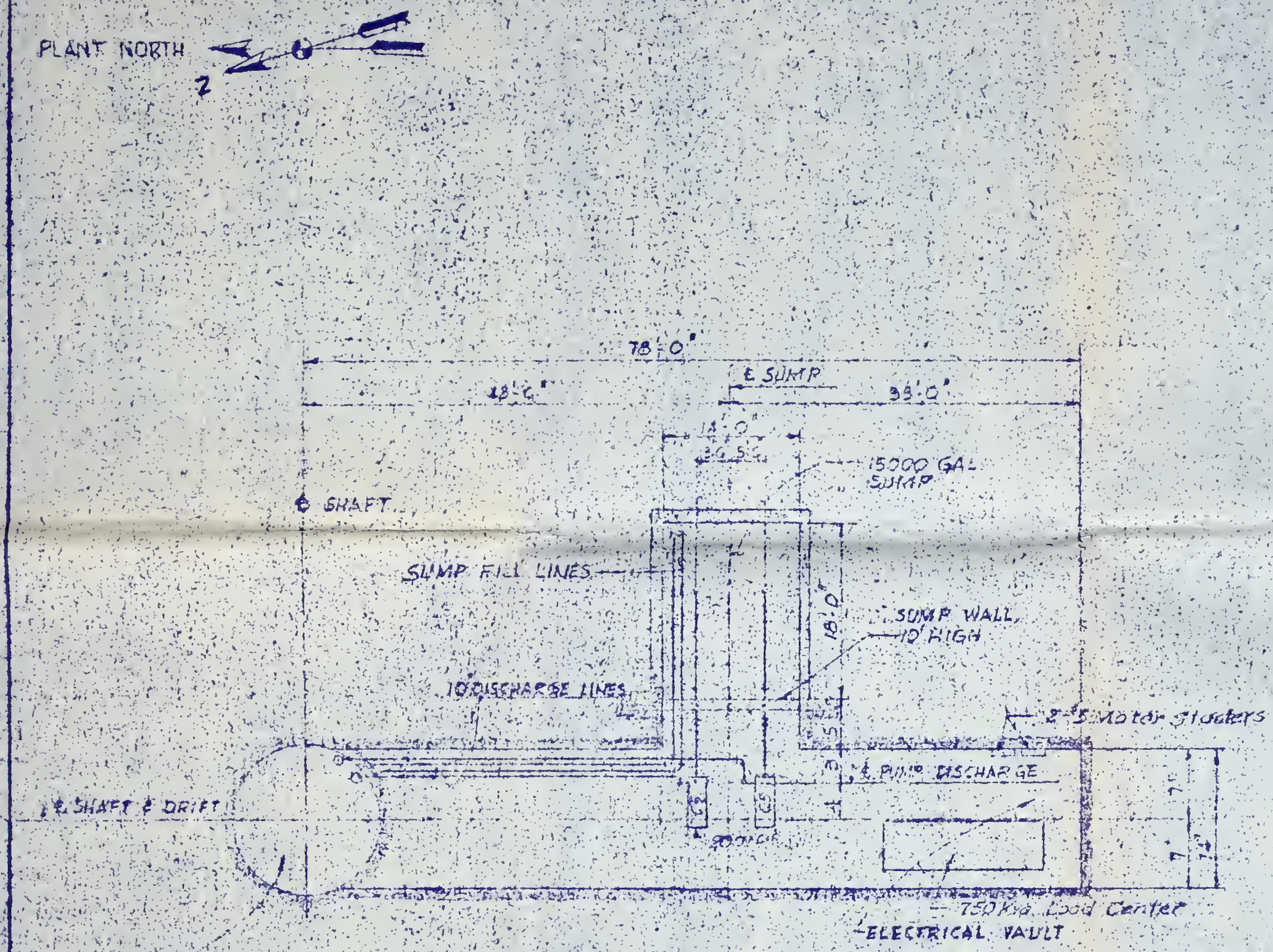

S 84°00'55" E
5319.35'
S 88°50'07" E
4665.48'
VENT/ESCAPE SHAFT
ANCILLARY AREA
TEMPORARY GAS SHAFT
EAST
NO NAME
RESERVOIR
STORAGE
TANK
AREA
2-5A.F.
RESERVOIRS
WATER LINE EL. 6765
BOTTOM EL. 6757
PUMP
STATION
ROAD
WATER LINE EL. 6760
BOTTOM EL. 6752
SERVICE
SHAFT
POWER CORRIDOR
PRODUCTION SHAFT
(N 8,000.00)
(E 16,000.00)
N 184,306.43
E 1,234,705.27
(N 7,846.58)
(E 17,525.72)
N 183,689.04
E 1,236,108.91
CONC. MON. E. EDGE
RIDGELINE ROAD
MINE SUPPORT AREA
GAS SHAFT
PROCESS AREA
(N.I.C.)
WATER LINE EL. 6948
BOTTOM EL. 6935
SITE FOR TWO 2-5A.F.
RESERVOIRS & M.W.
PRIMARY TREATMENT
FOR REINJECTION
WATER LINE EL. 6948
BOTTOM EL. 6940

FIG. - 2


15' ø VENTILATION-SHAFT
SURFACE
COLLAR ELEV. 6704'
(0' 0' LEVEL)
FEEDER CB (OIL OR AIR)
4160 VOLTS
LIC-3
250'
500'
750'
1000'
1250'
1500'
(2) EACH #4/0 B.COND. 5KV CABLE
(1) EA #4/0 BARE EQUIP GROUNDING COND
NOTE:
ONLY ONE #4/0 CABLE IS NECESSARY FOR CAPACITY, BUT TWO WOULD BE PREFERABLE W/1 FOR STANDBY. IF THE 4160 EXCEEDS WAS AVAILABLE ON SURFACE, THE THREE 5KV DISCONNECT SWITCHES, AS SHOWN ARE RECOMMENDED. IF ONLY ONE SURFACE BREAKER IS AVAILABLE THE 2-4/0 CABLES WOULD BE PARALLELED AND THE 5KV SPOLE & POS. ON SW WOULD SERVE.
EACH BANK TO CONSIST OF (3) 200 HP C-5 600 LB PUMPS CONNECTED IN SERIES AND FORCE FED BY (1) 100 HP C-6-5 PUMP, FOR THE OPERATING BANK ONLY, THE FIRST THREE STAGES WILL BE V-BELT DRIVEN WITH THE FOURTH STAGE DIRECT DRIVEN THROUGH A VARIABLE SPEED LIQUID DRIVE. FOR THE STANDBY BANK ALL FOUR STAGES ARE TO BE V-BELT DRIVEN WITH NO VARIABLE SPEED UNIT.
4160 V
480 V
480 V
750 kva
300 kva
750 kva
(2) EACH #4/6 3 COND. 5KV CABLE
(1) EACH #4/0 1 COND. BARE GNDG. COND.
4160 V.
480 V.
750 kva
480 V.
(2) 200 HP C-5 600 LB. PUMPS ARE V-BELT INSTALLED; (1) OPERATING AND (1) STANDBY. BOTH PUMPS ARE V-BELT DRIVEN.
(3) 125 HP C-5 600 LB. V-BELT DRIVEN TO BE HUNG IN THE SHAFT TO ALLOW STAGING FROM THE 3460' LEVEL. (1) OR (2) OPERATING AND (1) STANDBY.
480 V.
EACH BANK TO CONSIST OF (2) 200 HP C-5 600 LB. PUMPS CONNECTED IN SERIES. EACH PUMP TO BE V-BELT DRIVE. (2) BANKS ARE TO BE INSTALLED; (1) OPERATING AND (1) STANDBY.
4160
480
480
750 kva
750 kva
FIG. - 3
REVISIONS
MILLER SALES & ENGINEERING Co
TUCSON ARIZONA
OCCIDENTAL C-b OIL SHALE PROJ.
SHAFT SECTION FOR
VENTILATION & TEMPORARY GAS SH
MSS-0-22





PLAN

PUMP STATION at 1460' LEVEL (EL. 5244)

THIS PLAN IS SIMILAR TO THE ARRANGEMENT IN THE PRODUCTION & SERVICE SHAFTS AT EL. 1140'-0" (POSITION OF LINES IN THE SHAFTS VARY)

RMP 2-13-79
REVIEWED BY DATE

☐ NO COMMENTS — FINAL
☒ COMMENTS — PROCEED
☐ COMMENTS — DO NOT PROCEED
CORRECT AND RESUBMIT
☐ REVIEWED BY CLIENT BY 2-26-79

FIG.-7

REVISIONS		
No.	Date	Description
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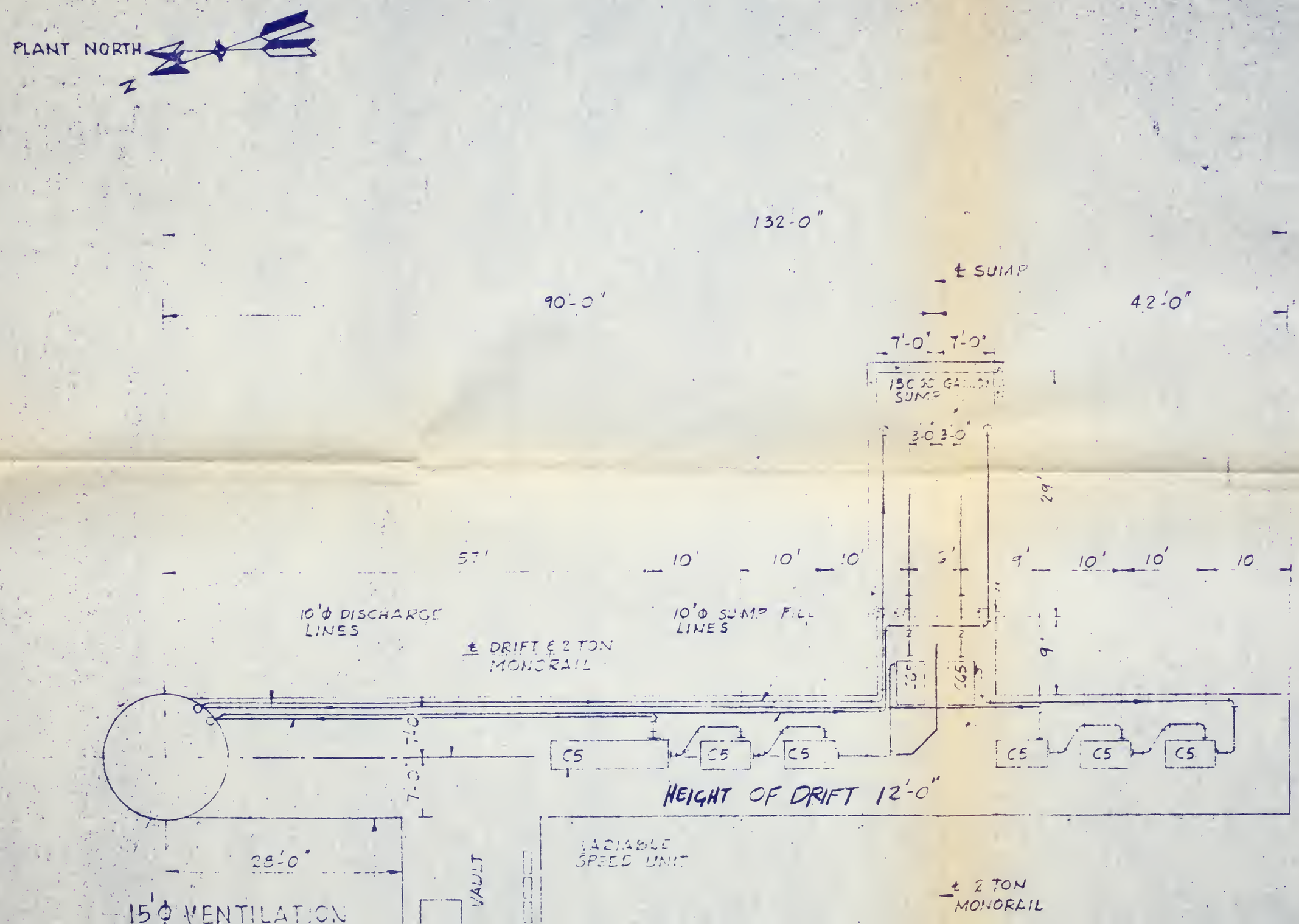
△		
△		
△		
△		

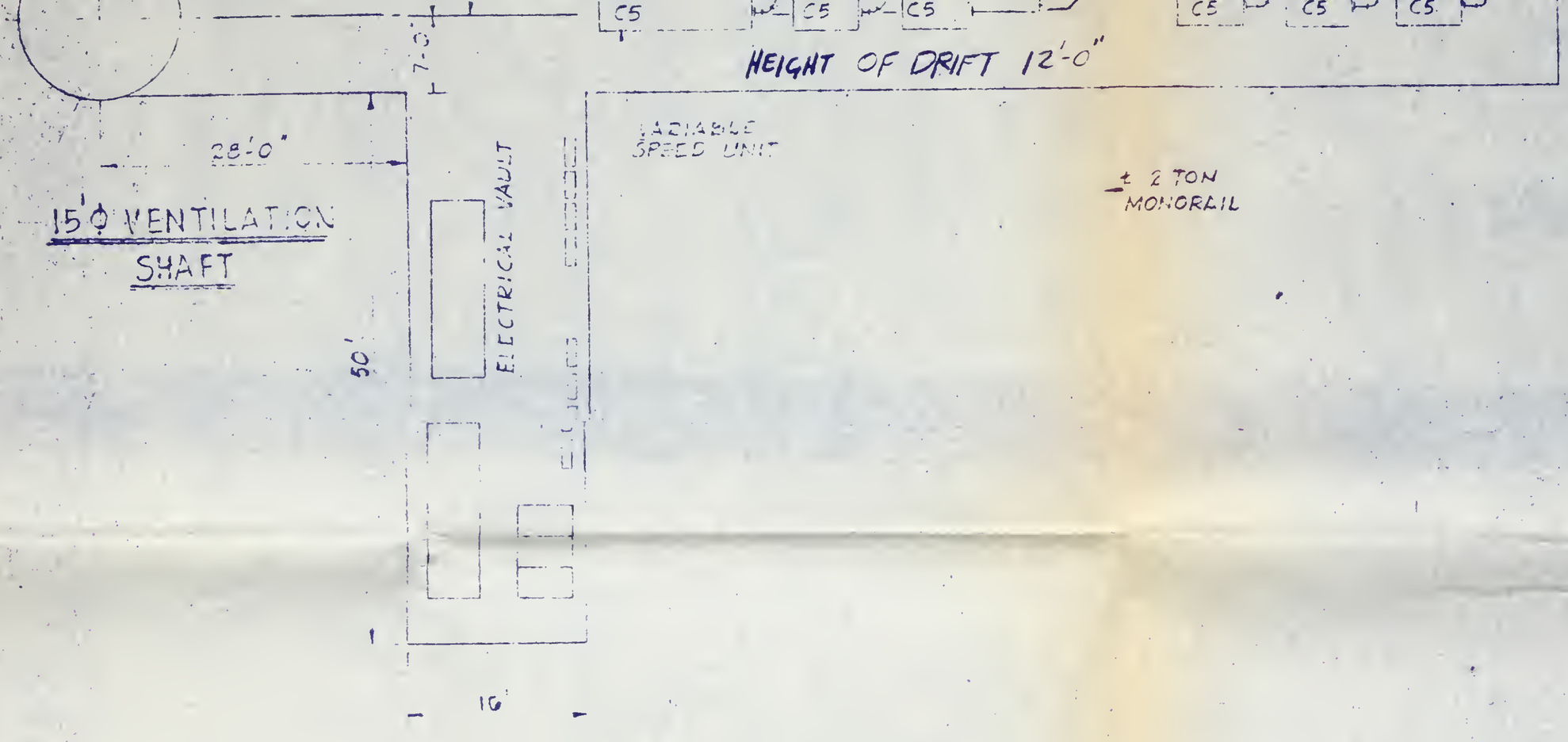
MILLER SALES & ENGINEERING CO.
TUCSON ARIZONA

SCALE: 1" = 15' | APPROVED BY: | DRAWN BY: C.R.M.
DATE: FEB. 7 1979 | CHECKED:

OCCIDENTAL C-b OIL SHALE PROJECT
VENTILATION SHAFT
PUMP STATION @ 1460' LEVEL
SCHEMATIC GENERAL ARRANGEMENT

DRAWING NUMBER: MSP-0-115


PLANT NORTH
N
132'-0"
℄ SUMP
90'-0"
42'-0"
7'-0"
7'-0"
150 000 GALLON SUMP
3'-0"
3'-0"
29'
57'
10'
10'
10'
5'
9'
10'
10'
10
10'Φ DISCHARGE LINES
10'Φ SUMP FILL LINES
℄ DRIFT & 2 TON MONORAIL
9'
C65
C65
7'-0"
C5
C5
C5
C5
C5
C5
HEIGHT OF DRIFT 12'-0"
28'-0"
VARIABLE SPEED UNIT
15'Φ VENTILATION
VAULT
℄ 2 TON MONORAIL



PLAN

PUMP STATION at 1100' LEVEL (EL. 5604)

THIS PLAN IS SIMILAR TO THE ARRANGEMENT IN THE VE SHAFT AT EL. 1667'-0" AND IN THE PRODUCTION AND SERVICE SHAFTS AT EL. 1699'-0" (POSITION OF LINES IN THE SHAFTS VARY)

RVP 2-13-79
REVIEWED BY DATE

☐ NO COMMENTS — FINAL
☑ COMMENTS — PROCEED
☐ COMMENTS — DO NOT PROCEED
CORRECT AND RESUBMIT
☐ REVIEWED BY CLIENT BY 2-26-79

FIG.-6

REVISIONS		
No.	DATE	DESCRIPTION

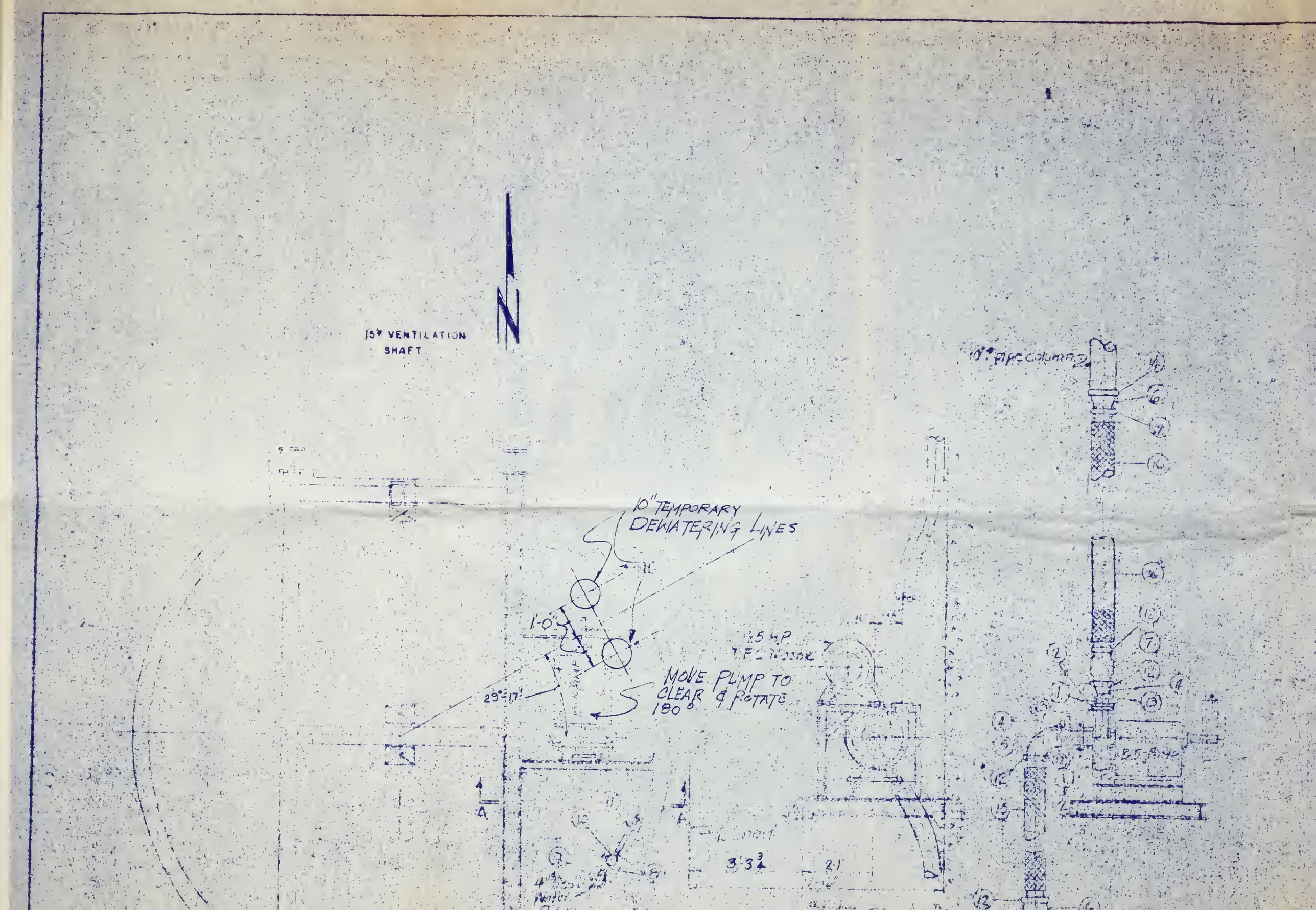
MILLER SALES & ENGINEERING CO.
TUCSON ARIZONA

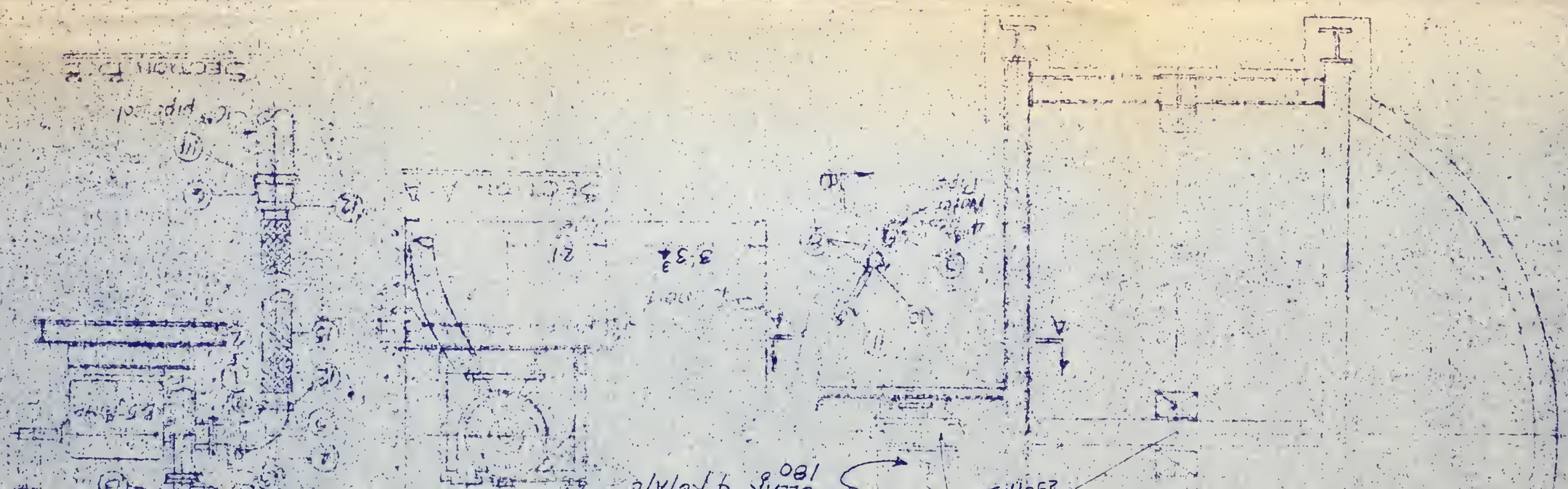
SCALE: 1" = 10'
DATE: 1-31-79
APPROVED BY:
DRAWN BY C.R.M.
REVISED

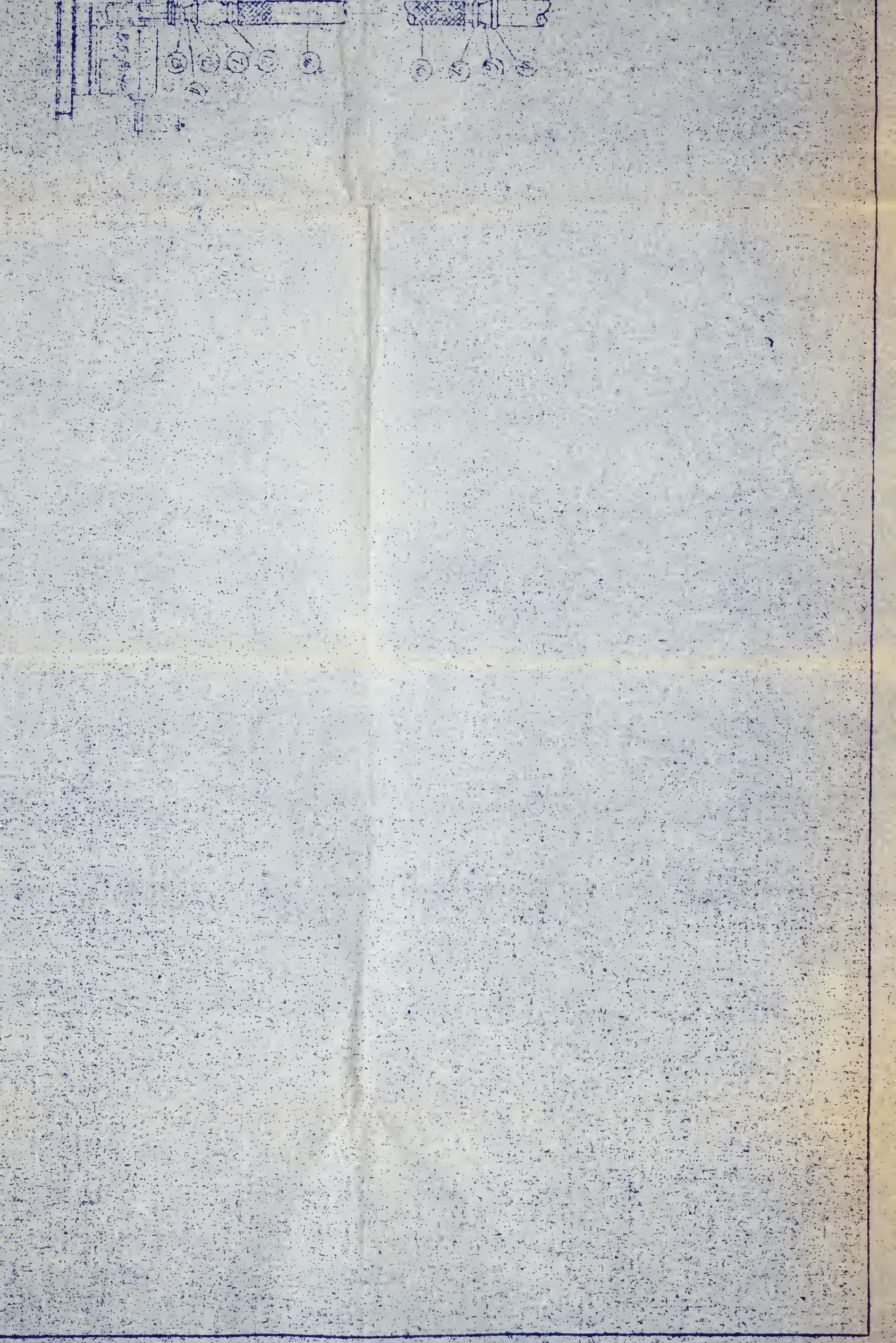
OCCIDENTAL C-b OIL SHALE PROJECT
VENTILATION SHAFT

1100' LEVEL PUMP STATION
SCHEMATIC GENERAL ARRANGEM'T

DRAWING NUMBER
MSP-0-110


15" VENTILATION SHAFT
N
10" TEMPORARY DEWATERING LINES
1'-0"
29'-11"
MOVE PUMP TO CLEAR & ROTATE 180°
A
3'-3"
2'-1"
10" PIPE COLUMN





RMP [signature] REVIEWED BY 2-13-79 DATE

☐ NO COMMENTS — FINAL
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☐ COMMENTS — DO NOT PROCEED
☐ REVIEWED BY CLIENT

JOB 5001

CORRECT AND RESUBMIT BY 2-26-79

FIG.-5

REVISIONS		
No.	Date	Description
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MILLER SALES & ENGINEERING CO.
TUCSON ARIZONA

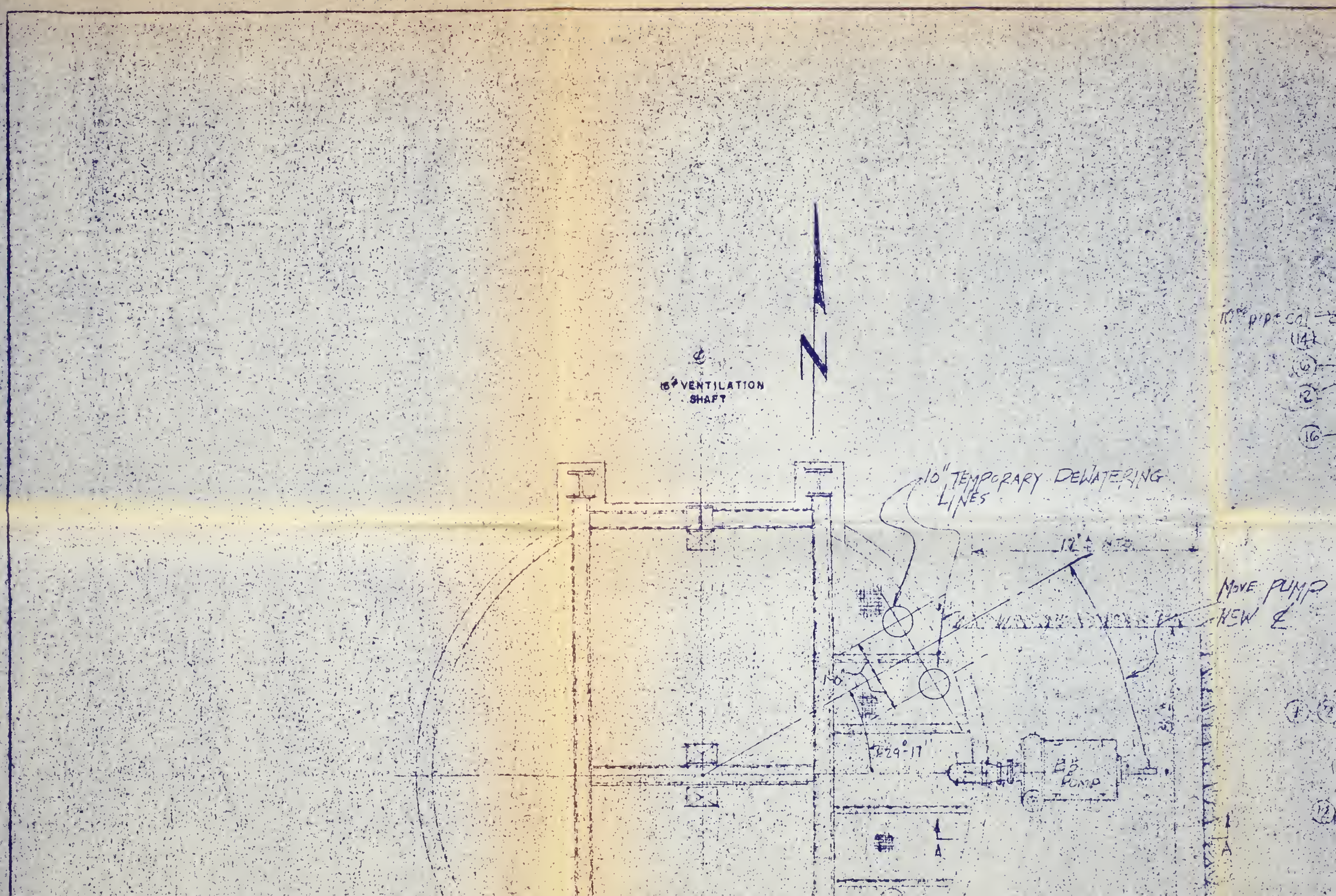
SCALE	APPROVED BY	DRAWN BY [illegible]
DATE: 2-[illegible]-79		REVISED

Prepared For
OCCIDENTAL Cb OIL SHALE PROJECT

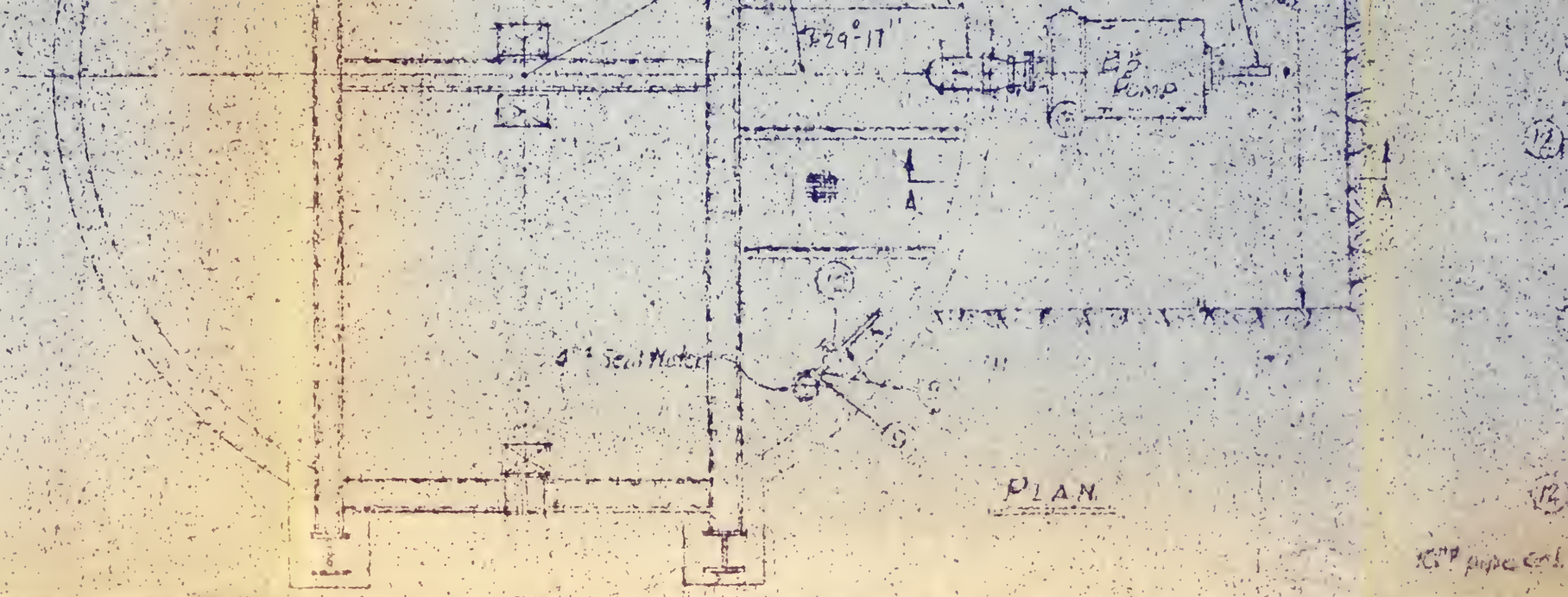
B-5 SINKING PUMP MOUNTING ARRANGEMENT ON SHAFT WALL - 15' VENTILATION

DRAWING NUMBER MSP-0-112

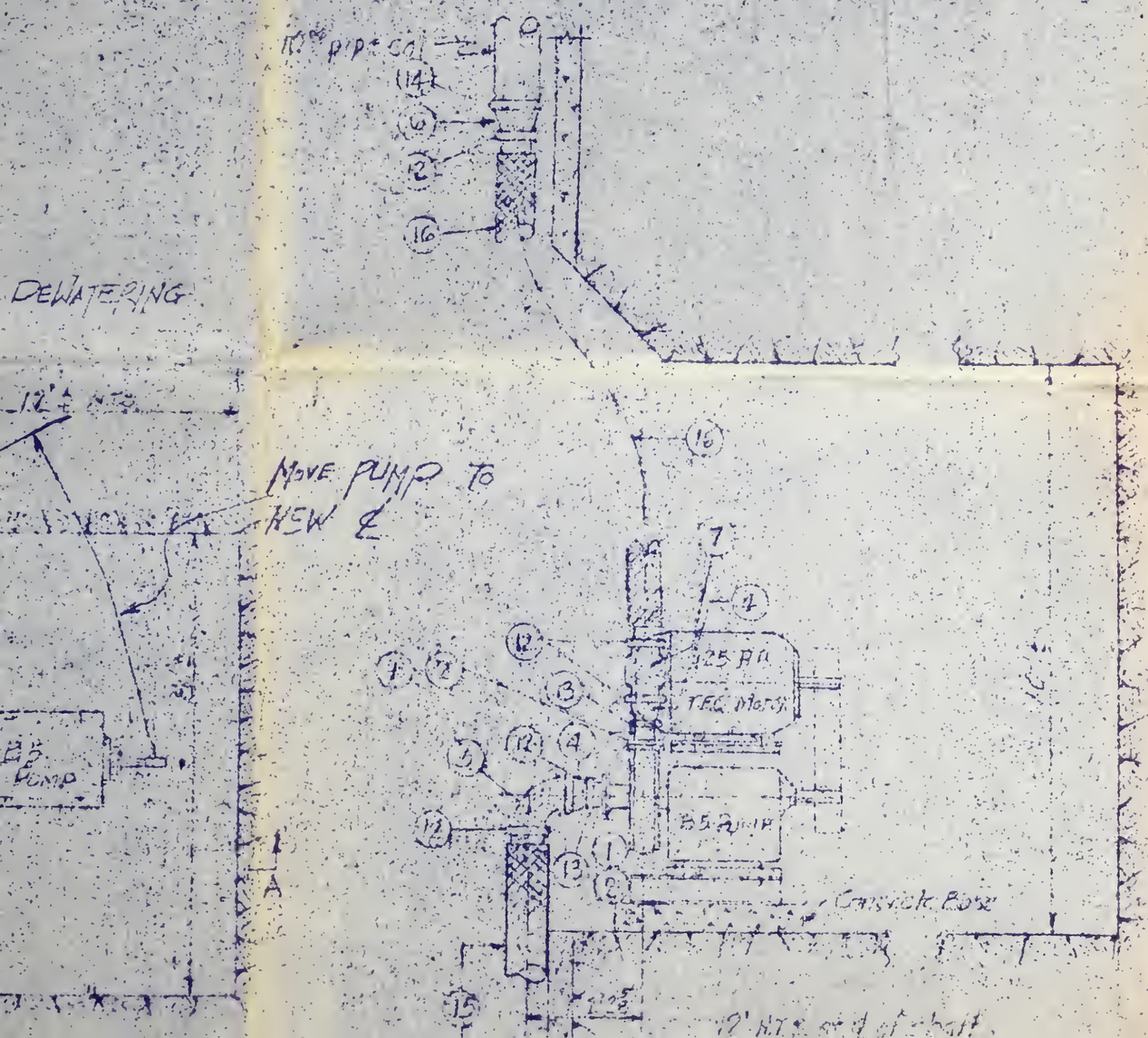
B



N
16" VENTILATION SHAFT
10" TEMPORARY DEWATERING LINES
12'
MOVE PUMP NEW ℄
29°-17'
PUMP
A
A
10" pipe col
14
6
2
16

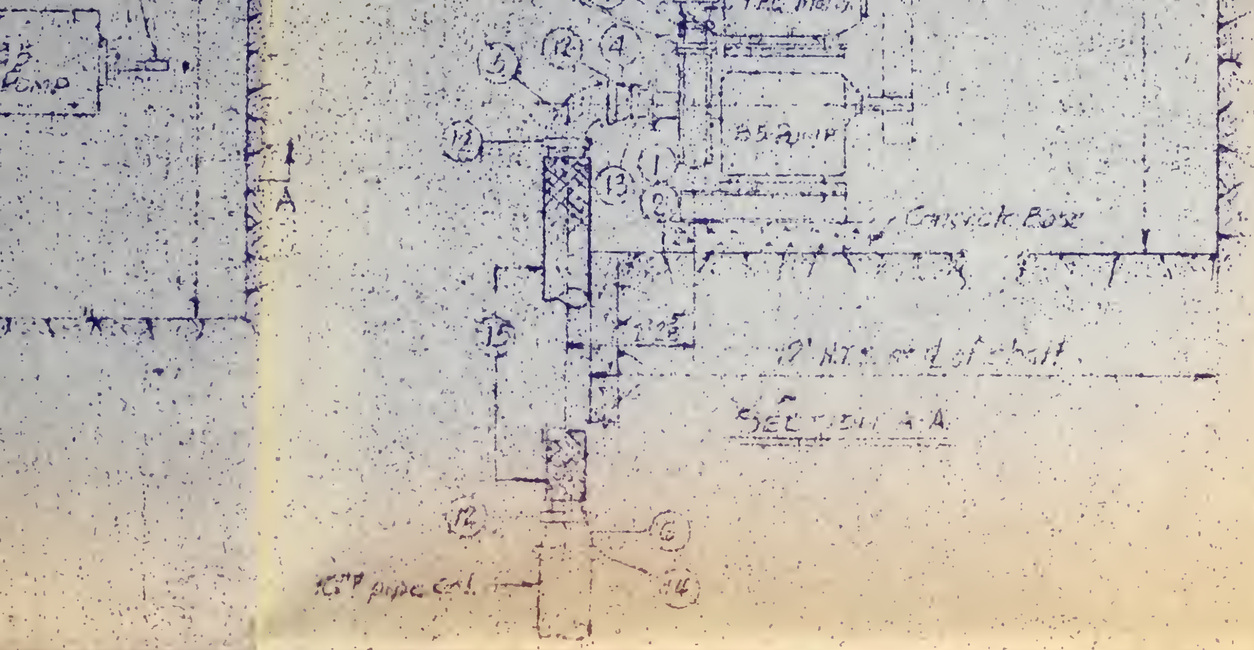


29°-17"
Pump
A
A
4" Seal Water
PLAN



BILL OF MATERIALS

Item No	QUAN	DESCRIPTION
		The following Bill of quantities are for 1 (one) Pump Set
1	2	4" 300# S.O. Welding Flange FF & D
2	2	4" Victaulic Beveled Adapter Nipple No. 42
3	16	3/8" x 5 1/2" long stud bolts
4	2	6 x 4" Victaulic Reducer No. 50
5	[illegible]	6" - 90° long radius victaulic Elbow No. [illegible]
6	2	10 x 6 Victaulic Reducers
7	1	6 x 6" Stellard check valve - Victaulic Ends



		The following fittings are for the Pump
1	2	4" - 400# S.O. Welding Flange - FF & D
2	2	4" Victaulic Beveled Adapter Nipple No. 42
3	16	3/8", 5 1/2" long stud bolts
4	2	6 x 4" Victaulic Reducer No. 50
5	1	6" - 90° long radius Victaulic Elbow No. 10
6	2	10 x 6 Victaulic Reducers
7	1	6 x 6" Standard check valve - Victaulic Ends
8	2	3/4" x 6" lg. galv. pipe nipples
9	1	4" 2000 x 3/4" Female Thread Outlet Victaulic Style 77 Outlet Coupling
10	1	Weld Flange for gate valve - 2" 4 series E-9581
11	1	3/4" x 10' lg. 1200 psi rubber hose with hose connection and one end with male thread fitting
12	6	6" Style 77 Victaulic Couplings
13	2	4" " " "
14	2	10" " " "
15	1	15 foot length sliding hose having internal Victaulic grooved hardened steel pipe ends - 600 psi W.P. - 1800 psi burst pressure Goodyear Spec 4-662-033 or equal
16	1	15 foot length sliding hose having internal Victaulic grooved hardened steel pipe ends - 600 psi W.P. - 1800 psi burst pressure Goodyear Spec 4-662-033 or equal

RMP 2-13-79
REVIEWED BY DATE
☐ NO COMMENTS — FINAL
☒ COMMENTS — PROCEED
☐ COMMENTS — DO NOT PROCEED
☐ REVIEWED BY CLIENT
JOB 5681
CORRECT AND RESUBMIT
BY 2-26-79

FIG.-4

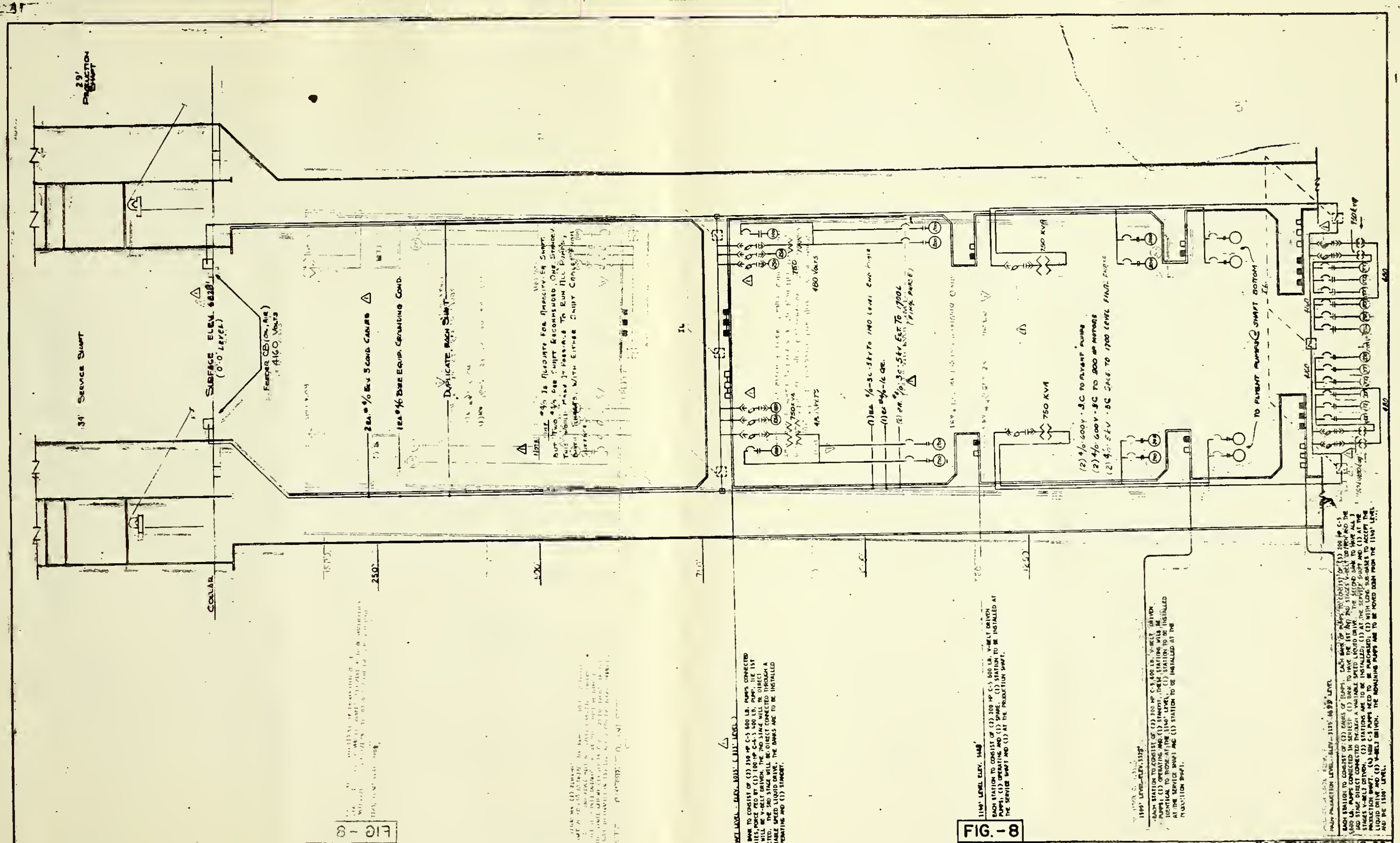
REVISIONS		
No.	Date	Description
△		
△		
△		
△		
△		

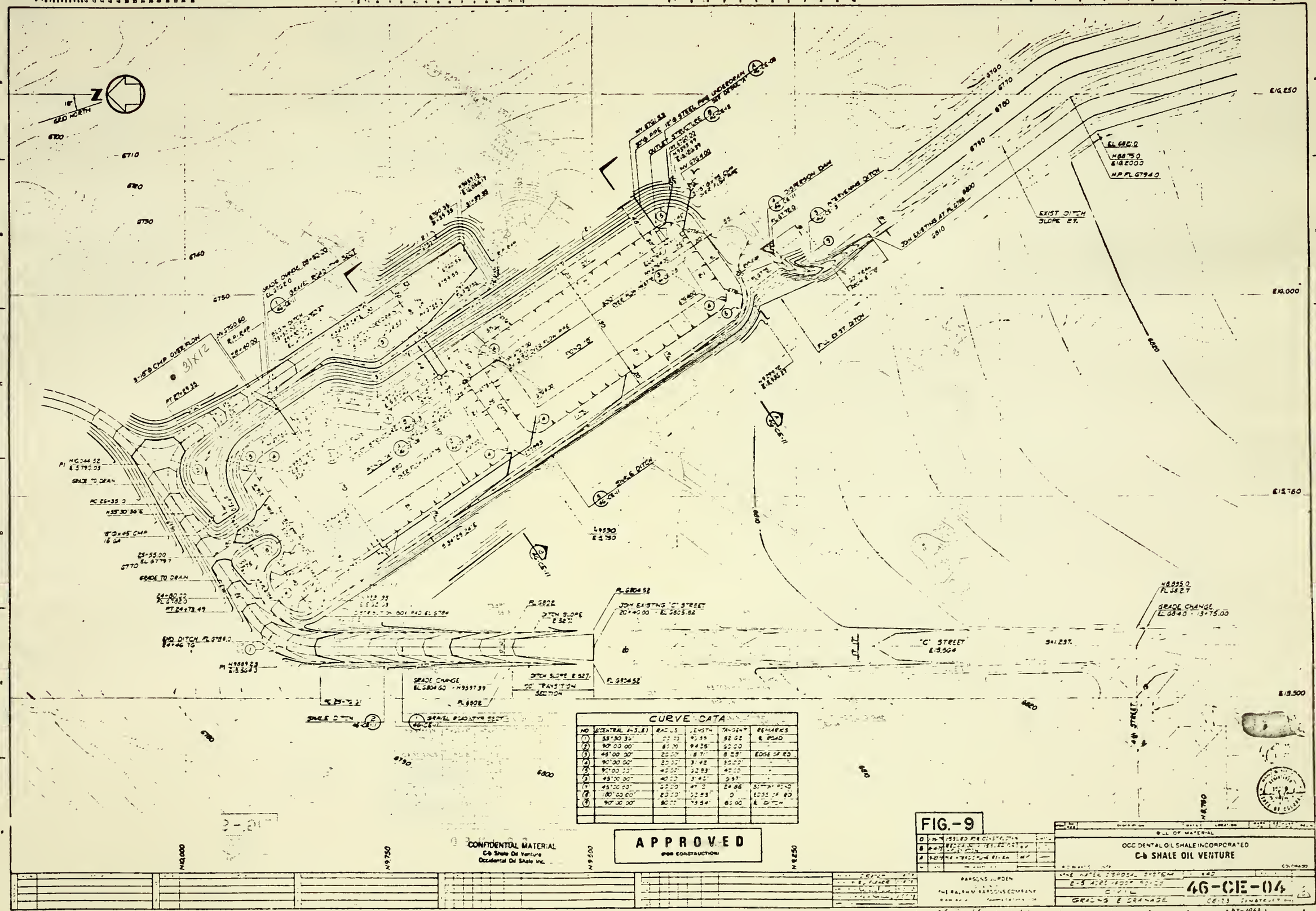
MILLER SALES & ENGINEERING CO.
TUCSON, ARIZONA

SCALE 1/2" = 1'-0" | APPROVED BY: | DRAWN BY: N. S.
DATE 2-7-79 | REVISED

Prepared For:
OCCIDENTAL C-b OIL SHALE PROJ.
B-5 SINKING PUMPS - MOUNTING ARRANGEMENT IN WALL NICHE - 15' VENTILATION SH.
DRAWING NUMBER MSP-O-113

MADE IN U.S.A.


29' PRODUCTION SHAFT
34' SERVICE SHAFT
SURFACE ELEV. 6828'
(0'-0" LEVEL)
FEEDER CB (OIL, AIR) 4160 VOLTS
2EA. #4/0 BARE EQUIP. GROUNDING COND.
1EA. #4/0 BARE EQUIP. GROUNDING COND.
DUPLICATE EACH SHAFT
750 KVA
480 VOLTS
750 KVA
TO PUMPS
SHAFT BOTTOM
COLLAR
250'
500'
750'
1000'
1250'
1500'
1750'
2000'
2250'
2500'
2750'
3000'
3250'
3500'
3750'
4000'
4250'
4500'
4750'
5000'
5250'
5500'
5750'
6000'
6250'
6500'
6750'
7000'
7250'
7500'
7750'
8000'
8250'
8500'
8750'
9000'
9250'
9500'
9750'
10000'



CURVE DATA					
NO	Δ(CENTRAL ANGLE)	RADIUS	LENGTH	TANGENT	REMARKS
1	55°30'30"	[illegible]	[illegible]	52.62	℄ ROAD
2	90°00'00"	[illegible]	94.25	[illegible]	
3	45°00'00"	20.00	[illegible]	8.29	EDGE OF RD
4	90°00'00"	20.00	31.42	20.00	
5	90°00'00"	40.00	62.83	40.00	
6	45°00'00"	40.00	31.42	6.87	
7	45°00'00"	[illegible]	[illegible]	24.86	BOTTOM POND
8	180°00'00"	20.00	62.83	0	EDGE OF RD
9	90°00'00"	[illegible]	[illegible]	[illegible]	℄ DITCH

CONFIDENTIAL MATERIAL
C-b Shale Oil Venture
Occidental Oil Shale Inc.

APPROVED
(FOR CONSTRUCTION)

FIG.-9

D	[illegible]	ISSUED FOR CONSTRUCTION
B	[illegible]	[illegible]
A	[illegible]	[illegible]

PARSONS JURDEN
THE RALPH M. PARSONS COMPANY

BILL OF MATERIAL

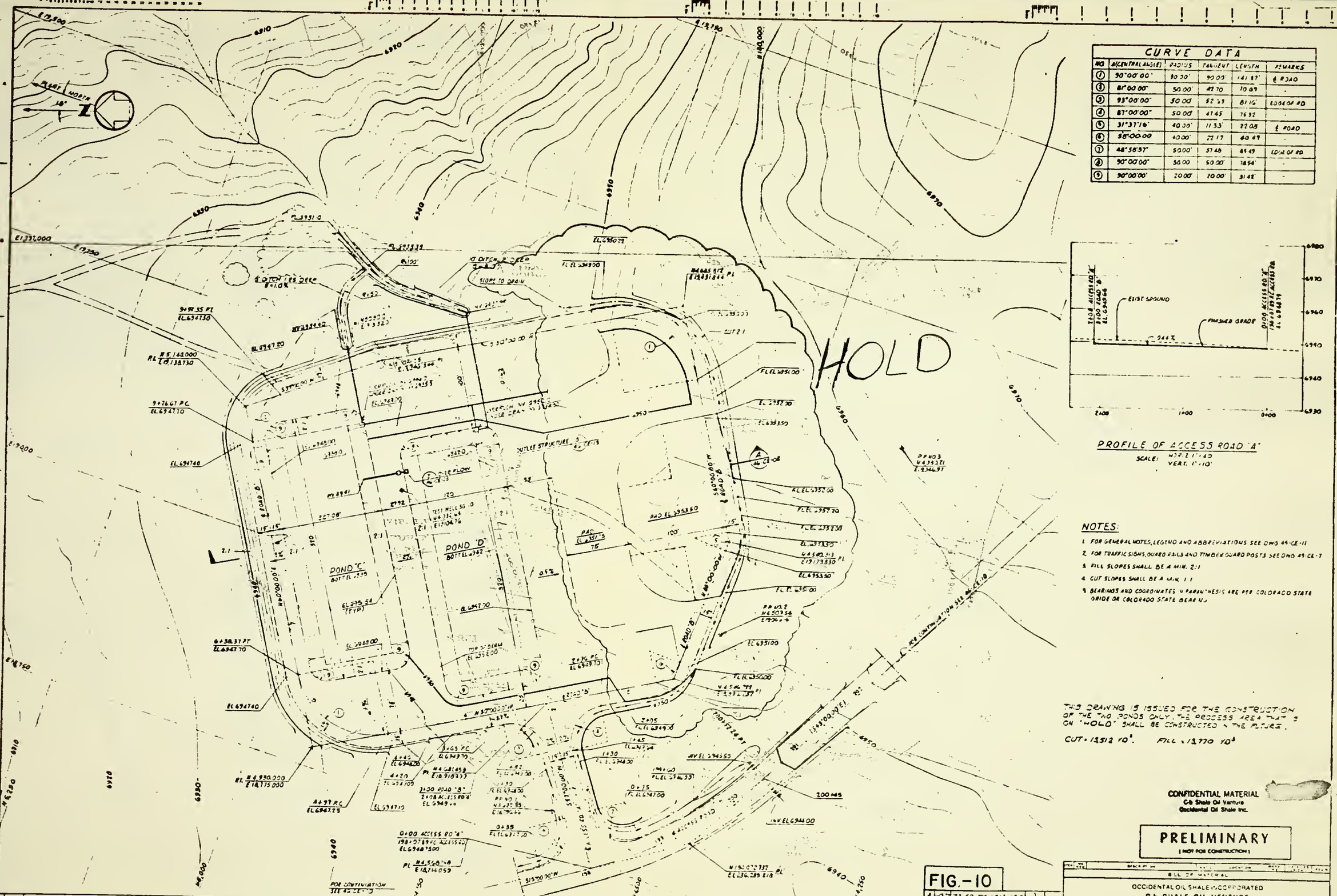
OCCIDENTAL OIL SHALE INCORPORATED
C-b SHALE OIL VENTURE

MINE WATER DISPOSAL SYSTEM
2-5 ACRE-FOOT POND
CIVIL
GRADING & DRAINAGE

46-CE-04

CE-23 CONSTRUCTION

DT-1062



CURVE DATA					
NO	Δ (CENTRAL ANGLE)	RADIUS	TANGENT	LENGTH	REMARKS
1	90°00'00"	90.00'	90.00	141.37'	℄ ROAD
2	87°00'00"	50.00'	47.70	70.69	
3	93°00'00"	50.00'	52.29	81.16	EDGE OF RD
4	87°00'00"	50.00	47.45	76.92	
5	31°37'16"	40.00'	11.33	22.08	℄ ROAD
6	98°00.00	40.00'	27.17	40.69	
7	48°56'57"	50.00'	57.46	85.69	EDGE OF RD
8	90°00'00"	50.00	50.00	78.54'	
9	90°00'00"	20.00'	20.00'	31.42'	

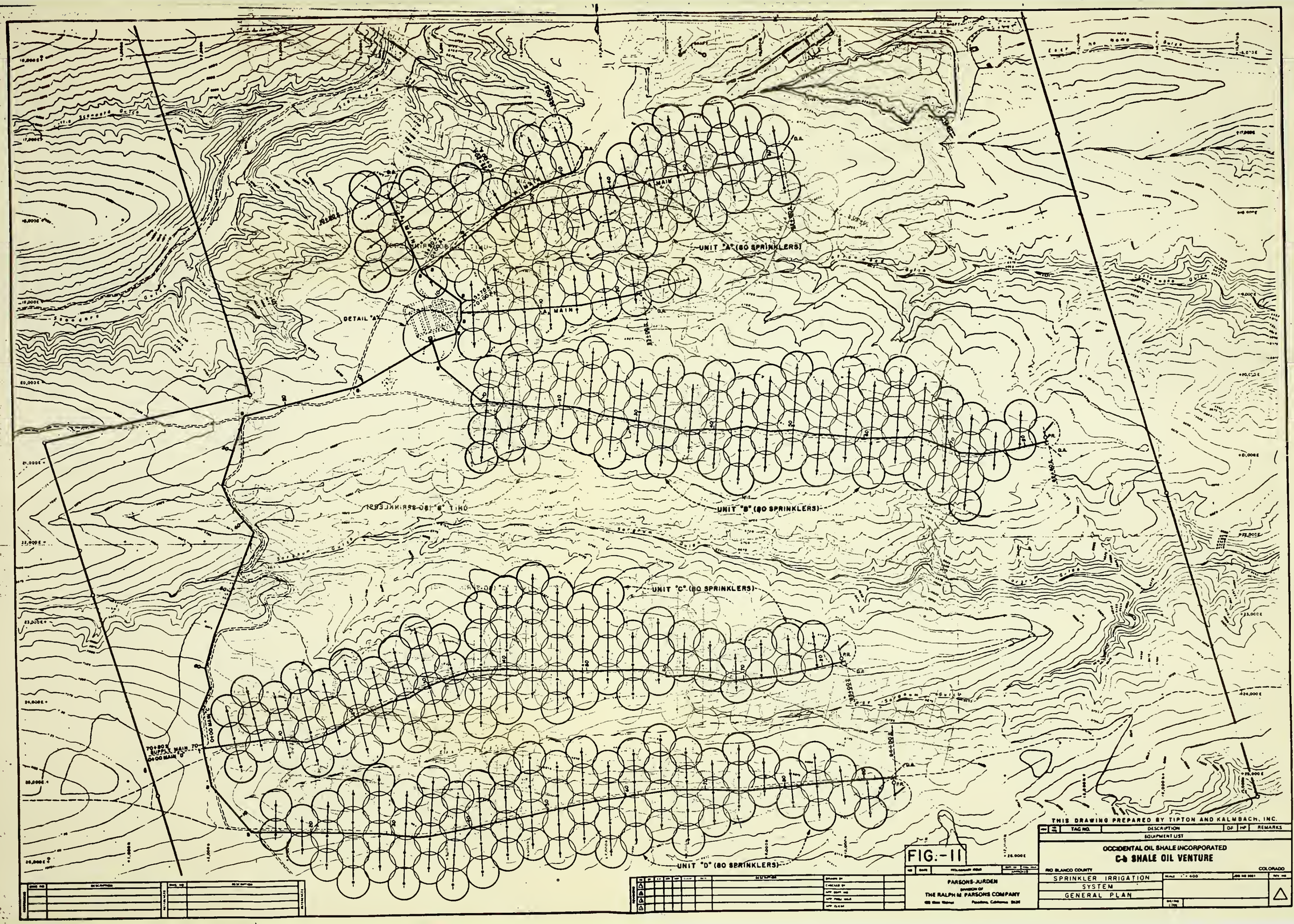

UNIT "A" (80 SPRINKLERS)
UNIT "B" (80 SPRINKLERS)
UNIT "C" (80 SPRINKLERS)
UNIT "D" (80 SPRINKLERS)
DETAIL "A"
A MAIN
70+80 SUPPLY MAIN
0+00 MAIN "C"
THIS DRAWING PREPARED BY TIPTON AND KALMBACH, INC.
TAG NO.
DESCRIPTION
DF
HP
REMARKS
EQUIPMENT LIST
OCCIDENTAL OIL SHALE INCORPORATED
C-b SHALE OIL VENTURE
RIO BLANCO COUNTY
COLORADO
SPRINKLER IRRIGATION
SYSTEM
GENERAL PLAN
PARSONS-JURDEN
DIVISION OF
THE RALPH M. PARSONS COMPANY

FIG.-11

Form 1279-3
(June 1984)

BORROWER

TN 859 .C64 C3

Water manageme

DATE LOANED	BORROWER

USDI - BLM